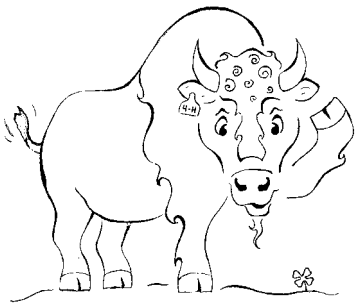
Feeds for Bison



Roll Call:
Name a feed ingredient which is used in a ration.

_____

Welcome to the level two section of feeds for bison. There is so much to learn about this topic. Talk to some of these people to find out more: Alberta Agriculture Bison specialist, local bison producers, parents, feed company representatives, 4-H leaders and senior 4-H members.

Feed intake

There are many factors which can affect how much feed a bison can eat. You need to know about these because they will affect the types and amounts of feeds and ingredients the animal will eat.

Factors affecting forage intake

1) Stage of maturity
The fibre content of forages increases as the forage matures. Higher levels of fibre in forage will reduce feed intake, although it is commonly believed that bison are better at digesting higher levels of fibre than beef counterparts.

2) Weathering
Weathered feeds will suffer from leaching of nutrients and these feeds are more subject to mold, and mold growth will reduce intake. Although it is commonly believed that bison can do better on poorer quality feeds than that of beef cattle, it is still recommended that they be given quality feeds in lesser amounts.

It is also important to note that moldy feeds should not be fed to pregnant bison cows. Ingestion of molds could cause mycotic abortion, which is the result of toxins entering the blood stream and becoming absorbed by the fetus. This could

result in abortion, or it could affect the immune system of the newborn causing the calf to be slow growing and suffer from illness. The best prevention is to limit the feeding of any questionable feed to bulls or finishers.

3) Forage species
Ruminants will consume greater amounts of legumes than grasses.
Leafy species, such as legumes, are more digestible resulting in faster passage through the digestive system and therefore increase the consumption. Because bison have a longer feed retention time than cattle, they are believed to be slightly more efficient at digesting grasses.

4) Physical form
In beef cattle grinding will increase forage intake because it will increase digestibility, however to date the effects of grinding have not be thoroughly researched for bison so the benefits are not clear.

5) Grain feeding
Grain feeding will depress feed intake, especially if grain is fed before forage. All animals tend to eat until they have satisfied their energy requirements. Grains are higher in energy and require less pounds to fill requirements.

6) Fermentation
Consumption of silage, on a dry matter basis, will be less than if the same quality and matter of hay is fed. To date, silage has not been considered a common feed source for bison, however with increased numbers being fed for slaughter the use of silage may become more prevalent.

Factors affecting dry matter intake

1) Bison status
Healthy thin bison will consume more than bison in normal condition. Older and more fleshy bison will consume less than younger, leaner bison. Lactating cows will eat 40 to 60 % more than dry cows.

2) Weather
Cold weather will cause feed intake to increase as animals strive to obtain the extra heat required to maintain body temperature. It is important to recognize that in cold weather the bison need more forage matter than grain energy.

The heat of digestion will help to maintain body heat. Warm weather will cause intake to decrease.

3) Nutrients
An animal which has a nutrient deficiency will have a decreased intake of dry matter.

What does all this mean?

You can use this information to decide how to adjust your animal's diet when you must change the feed ingredients. For example, if you are into some better quality hay, you can decrease the amount you need to feed. You can also use this information when deciding how to feed. For example, you will need to feed a group of thinner cows more than a group of older, more fleshy cows. If the weather becomes colder, you will need to increase the feed available for your animals.

Dry matter/moisture free

Suppose your hay had 13% moisture. Then, it would have 87% dry matter (DM). The results you receive on your feeds may be calculated on a dry matter, a moisture-free or an as-fed basis. It is important that you are able to convert them to the format you require.

Keep these formulas in mind:

$$\%DM = \frac{(100 - \%moisture)}{100}$$

Nutrient Concentration (As Fed) = Nutrient Concentration X %DM (Moisture Free)

Feed processing

Feed processing is a common practice in feeding beef animals. It is done to

1. Increase digestibility.
2. Increase palatability.
3. Improve or facilitate handling and ration formulation.
4. Reduce wastage.

Indications to date have not shown there to be significant advantages to processing grains for bison as their digestive system is efficient at digesting high fibre, and the extra cost and labour involved in processing is not proven to be advantageous. Studies conducted for digestion of grains by sheep has incidated that there is no advantage to processing. With more research in bison nutrition we will get a clearer picture of how to improve their cost and efficiency. The following are the types of processing currently done for feeding beef cattle.

Roller mill

The roller mill crushes the grain to a flat, flake like structure. There will be fewer fine particles in the feed. Fines in feed is undesirable as it could cause bloat.

Hammermill

The grain is bashed around in the hammermill until it is small enough to fall through the screens. The holes in the screens can be varied from 1/8 to 1/2 inch in diameter. Feed companies use the hammermill to prepare feeds for pelleting.

Pelleting

Fats and, or molasses are added to the feed ingredients during mixing. They help the pellet hold its shape as it hardens, and reduce dustiness. Vitamin and mineral supplements are spread evenly through the feed during pelleting.

These are the steps followed in pelleting feeds:

1) The ration is mixed.
2) The feed is put through the hammermill.
3) Feed moves into steam chamber where moisture is added.
4) The feed is forced through a die to shape the pellet.
5) The pellets are put in the cooler to firm and harden.

Typically bison are being grain fed oats. Whole oats have a higher fibre and lower energy level compared to wheat and barley.
If you were to substitute an equivalent quantity of either wheat or barley for the current quantity of oats, it could result in rumen acidosis. When comparing the cereal grains, feeding 10 lbs. of oats is equivalent to 9 lbs. of barley and approximately 8.5 lbs. of wheat; therefore it is important to know this before changing the ration.

Bison ration formulation

All animals need

- An ample supply of fresh water.
- A source of energy to provide the fuel required to operate their body and maintain body temperature.
- A source of protein for growth and replacement of old worn out tissue.
- A source of minerals and vitamins that act as catalysts and constituents for the chemical reactions that take place in the body.

The feeds an animal eats should provide these in the proper proportions for efficient production.

The following is an overview of bison ration formulation. Work through the formulation, using the information you have about the feeds for your animals.

Step 1 - Determine the requirements of the bison animal.

What type of bison will you be feeding?

_____

What do you want them to weigh at the end of the feeding period?

_____

What average gain do you want to achieve?

_____

The National Research Council (NRC) tables provide the minimum requirements for cattle of different types and ages. These will have to be adjusted for local conditions.

Step 2 - Evaluate your feeds.

- What types of feeds do you have available?
- What amount of each of these do you have?
- What costs should you put on these feeds?
- What are the nutrient contents of each feed you intend to use?

List your feeds and supplements. List their nutrient contents. For each feed, indicate the amount of each nutrient in one kilogram of the feed.

Type of feed	DE Mcal	% Protein	% Ca	% P

(TDN conversion to Digestable Energy is: for every unit of TDN/kg of feed there is 0.04409 Mcal of DE)

Step 3 - Formulate the ration.

Decide on the approximate amounts of each feed to give your animal.
(you can obtain approximate value from NRC standard tables)

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Determine the amount of feed needed to supply the animal's digestible

Energy (DE) requirements. DE required _____

Understanding what your bison need for energy requirements will make a big difference in your profits and herd health.

The first line information is only an example! Say we had a feed that we were using and feed tests showed the following:
Alfalfa Brome Hay
9% protein
2.3 Mcal/Kg energy
0.012% calcium
0.0073% phosphorous
16% moisture (84% DM)

Feed	**Amount fed (kg)**		**Amount of DE in 1 kg (Mcal)**	**Total DE supplied (Mcal)**
Example: Alfalfa Brome	8	X	2.3 Mcal	18.4 Mcal
		X		
		X		
		X		
		X		
		X		
Total				

Can the animal consume this amount of feed?_____

Animal's Body Weight _____

Amount of Dry Matter fed as % of body weight = $\frac{\text{Total Amount Fed}}{\text{Body Weight}}$ X 100

Would your animal consume this amount? _____

An animal can consume feed daily at the rate of 1.4 – 1.8 percent of bodyweight in dry matter for the winter months and 2.2 – 3.0% bodyweight for the summer.

Note: With an increase in day length, there is a decrease in melatonin secretions from the pineal gland. Lower melatonin levels allows for an increase growth hormone and thyroxin secretion, resulting in an increase metabolic rate. Therefore the summer metabolic rate will require more fuel from feed energy. This is a very significant difference between bison and beef cattle.

Feed	**Amount fed (kg)**		**Amount of DM in 1 kg (Mcal)**	**Total DM supplied (Mcal)**
Alfalfa Brome	8 kg	X	84%	(.84 x 8) 6.72 Mcal
		X		
		X		
		X		
		X		
		X		
Total				

Calculate the amount of protein supplied by this feed. DE required

Feed	**Amount fed (kg)**		**Amount of protein 1 kg**	**Total protein supplied (kg)**
Alfalfa Brome	8 kg	X	9 %	(8 x .09) 0.72
		X		
		X		
		X		
		X		
		X		
Total				

If the protein supplied is not enough to meet the animal's minimum requirement, you will need to supply a protein supplement or try again using a higher protein feed.

Protein supplement required

_____

If you made significant changes to adjust for protein, check again to make sure the energy level is still adequate.

Calculate the amounts of calcium and phosphorus supplied by the total ration.

Phosphorus required

Feed	**Amount fed (kg)**		**Amount of phosphorus in 1 kg**	**Total phosphorus supplied (kg)**
Alfalfa Brome	8	X	.0073	(8x.0073) .0584 kg or 58 g
		X		
		X		
		X		
		X		
		X		
Total				

Calcium required

Feed	**Amount fed (kg)**		**Amount of calcium in 1 kg**	**Total calcium supplied (kg)**
Alfalfa Brome	8	X	.012	(.012x8) .096 kg or 96 g
		X		
		X		
		X		
		X		
		X		
Total				

Add the needed amounts of Vitamin A, fortified or trace mineralized salt, and other trace minerals as required.

Check to make sure the ration is practical for your situation.

Calculate the cost of ration. Keep in mind that bison, like a cow tend to waste some feed. This has not been accounted for in your calculations. Therefore, the actual amount of feed you offer should be slightly higher than what you have calculated.

Feed	**Amount fed (kg)**		**Cost/kg ($/kg)**	**Total cost ($)**
		X		
		X		
		X		
		X		
		X		
		X		
Total cost				

Feed intake

Each of the following affects the bison by either making it increase or decrease its feed intake.
In the blank, put an "I" if the event makes the animal increase its feed intake.

Put a **"D"** if the event makes the animal decrease its feed intake.

_____ The animal is now lactating.

_____ The days have become much longer. (summer)

_____ You have used up all of the poorer quality hay and are now into some very good hay.

_____ Winter has hit!

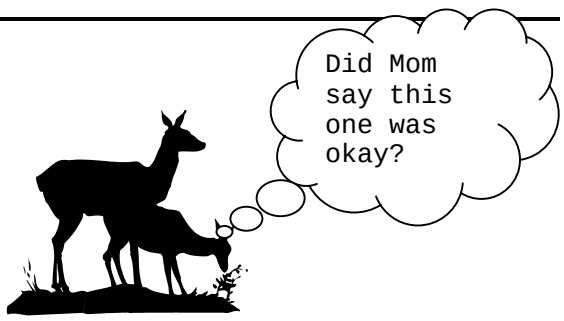
_____ You have switched to feeding grain before the roughage.

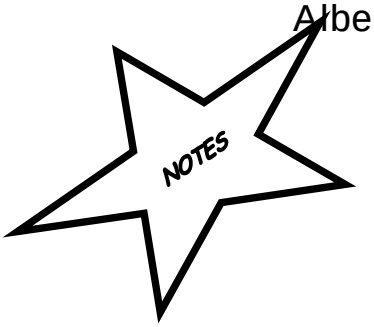
_____ You are now feeding legume hay instead of grass hay.

_____ Although healthy, your cow is much thinner now.

_____ You suspect that there is a nutrient missing in your animal's diet.

There are other things which might affect the feed intake of your animals. Describe some of these.

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